Before the

Federal Communications Commission

Washington, D.C. 20554

In the Matter of	)	
	)	
Allocation of Spectrum Below	)	ET Docket No. 94-32
5 GHz Transferred from	)	
Federal Government Use	)	

REPLY COMMENTS OF THE RADIO AMATEUR SATELLITE CORPORATION

Original Copy

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Summary

The Radio Amateur Satellite Corporation (AMSAT) respectfully submits these Reply Comments in response to comments submitted to the Commission's Notice of Proposed Rule Making, ET Docket No. 94-32, released November 8, 1994.

AMSAT finds that most of those commenting are not in compliance with the Reconciliation Act as enacted by Congress, and maintains that the Commission has no alternative but to dismiss such comments as non-responsive. In addition, we find that many of those commenting have very poor technical grounds on which to base their proposals.

AMSAT urges that the Commission, at least follow the recommendations we submitted with our comments; namely that amateur radio be afforded a segment in the vicinity of 2304 MHz on a Primary basis and that it retain access to 2390- 2400 MHz and 2410-2450 MHz and, along with the amateur satellite service, be granted Primary status in the 2400-2410 MHz band. The amateur satellite service should also retain access to the 2410-2450 MHz band. However, AMSAT supports those proposals which would grant the amateur service and the amateur satellite service allocations which are superior to these.

We are in general agreement with those which advocate the use of 2400-2450 MHz, or 2390-2450 MHz for unlicensed low power spread spectrum Part 15 devices. AMSAT believes that, with proper equipment design, such use appears to be compatible with the amateur service and the amateur satellite service. We strongly disagree with those which propose that this spectrum be allocated to new licensed services.

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The Radio Amateur Satellite Corporation (AMSAT) respectfully submits these Reply Comments in response to comments submitted to the Commission's Notice of Proposed Rule Making, ET Docket No. 94-32, released November 8, 1994 (the "NPRM").

I BACKGROUND

1. AMSAT, a not-for-profit District of Columbia corporation established in 1969, is the principal membership organization of the amateur satellite community in North America. Our current membership is approximately 7,500. Together with more than 30 of our affiliated organizations throughout the world, we have constructed, launched and operated over two dozen satellites to date in the amateur satellite service, of which the majority are presently in operation. These currently operational spacecraft include high-altitude, Molniya-type orbit transponder satellites capable of sustaining two-way communication over terrestrial paths well in excess of 10,000 miles (AMSAT-OSCAR 10 and AMSAT-OSCAR 13), numerous low-earth-orbit (LEO) digital store-and-forward packet radio satellites, scientific and educational payload satellites, LEO analog transponder satellites, and several spacecraft featuring combinations of these types of payloads.

II Provisions of the Reconciliation Act

2. The Reconciliation Act[1] requires that the Secretary of Commerce identify at least 200 MHz of spectrum currently allocated for use by Federal Government agencies for transfer the FCC for use in the private sector. All of the 200 MHz must be below 5 GHz and at least 100 MHz must be below 3 GHz and 50 MHz of that must be available immediately. The Reconciliation Act also provides that, in making this allocation change, the Department seek to avoid

"excessive disruption of existing use of Federal Government frequencies by amateur radio licensees".

In addition, the Reconciliation Act [2] specifies that the Secretary shall consider, in analyzing the benefits from a particular reallocation,

"the extent to which, in general, commercial users could share the frequency with amateur radio licensees."

Finally, the Reconciliation Act lists five possible grounds for the substitution or withdrawal of proposed reallocation frequencies, one of which is if:

"the reassignment will disrupt the existing use of a Federal Government band of frequencies by amateur radio licensees"[3].

In view of the integral role in this reallocation process which the Reconciliation Act assigns to the Commission (including, for example, joint spectrum planning between the Commission and NTIA[4] and sole responsibility for review and analysis of public comments in response to the NTIA's

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[1] Omnibus Budget Reconciliation Act of 1993, Pub L. No. 103-66, Title VI, $ 3001(a)(3), 107 Stat.312 (approved August 10, 1993; see also H.R. Rep. No. 103-213 103rd Cong., 1st Sess. (1993).

[2] 47 U.S.C. para. 923(c)(3)(C),

[3] 47 U.S.C. para. 924(b)(2)(E)

[4] 47 U.S.C. para. 922.

Preliminary Report[5] [6], it is clear that it is the intent of Congress was to protect the amateur radio community from excessive disruption, and that at this point in the proceedings, the responsibility for such protection now rests on the Commission. We discussed this point at greater length in our comments[7] as has the American Radio Relay League (ARRL)[8] .

3. With the exception of the ARRL and Apple[9], none of the NPRM comments we have had the opportunity to review in the short time available, adequately address this important provision of the Reconciliation Act . AMSAT cannot express strongly enough, our agreement with ARRL with respect to this issue. For the reasons stated in ARRL's comments as well as our own comments, we believe that the Reconciliation Act requires (emphasis AMSAT's) the Commission to dismiss, as non-responsive, proposals which ignore or are inconsistent with this Congressional mandate.

4. The comments of LORAL/Qualcomm Partnership, LP (LQP)[10] are a prime example. They do not even mention the words "amateur radio" or "amateur satellites". Instead, they propose to "grab" all 50 MHz Megahertz of spectrum now being transferred from Government use to the private sector for their particular project, non-GSO MSS; with no reference to the impact of such action on any other current or potential users,.

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[5] NTIA Special Publication 94-27.

[6] 47 U.S.C. para. 923(d).

[7] See AMSAT comments on ET Docket 94-32 filed Dec. 16, 1994. at Para. 3.

[8] See ARRL comments filed in ET Docket 94-32 filed Dec. 19,1994 at Para. 5.

[9] See comments of Apple Computer Inc. filed December 19, 1994 and amended December 20, 1994.

[10] See Comments of LORAL/QUALCOMM PARTNERSHIP

5. The comments of Southwestern Bell Telephone Company (SWBT)[11] are another such example. While they do refer to "existing amateur operations in the 2390-2400 and 2300-2310 MHz band", and state that "sharing of this spectrum by wireless local loop systems and amateur operators is problematic, particularly in high population density areas"; they go on to urge the allocation of 2300-2310 and 2390-2400 MHz for "exclusive (emphasis AMSAT's) use in deploying wireless local loop technology". They do recommend that the Commission consider (emphasis AMSAT's) allocating another spectrum band (2402-2410 MHz for amateur use on a primary basis. In that limited respect, their proposal reflects those of ARRL[12] which urged that the amateur service be given at least co-primary status from 2390-2450, and AMSAT's[13] which suggested that the amateur service be given a primary allocation from 2390-2410 plus secondary status from 2410-2450 MHz and the amateur satellite service be given primary status from 2400-2410 MHz and secondary status from 2410-2450 MHz. Despite this "nod" in the direction of accommodating amateur radio; in AMSAT's opinion, their proposal falls far short of providing the protection of amateur radio intended by Congress in that it makes no showing whatever that WLL systems would not cause disruption of existing and near-term planned amateur radio operation in the 2300-2310 MHz and 2390-2400 MHz bands. Indeed, if SWBT's own Reply Comments on this point to the Commission's NOI[14] are to be believed, this proposed use would not be compatible with amateur radio as much of SWBT's "local loop" application would be in residential areas

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[11] See Comments of Southwestern Bell Telephone Company.

[12] See ARRL comments at para. 24.

[13] See AMSAT comments at para 23.

[14] See SWBT Reply Comments filed June 30, 1994 beginning at the bottom of page 7.

where amateurs reside. It is evidently for this reason that SWBT desires an exclusive (emphasis AMSAT's) allocation in these bands. In our view, nothing would be more inconsistent with the intent of Congress in the Reconciliation Act than the removal of amateurs from presently-utilized spectrum as proposed by SWBT.

6. AT&T[15] has cautioned against making new assignments in the 2400-2483.5 MHz range that might jeopardize its use for spread-spectrum Part 15 devices, especially for wireless LAN applications. They have said that sharing with the amateur services would be acceptable, but that they would want to prohibit any new non-amateur users in the 2402-2417 MHz segment. As we noted in our comments, we believe that such applications are generally compatible with continued amateur use of these frequencies. We are not aware of any significant interference problems which have arisen to date; moreover, as unlicensed Part 15 devices, such applications are required to protect amateur radio from interference and to accept any interference which they might receive from amateurs. We must point out, however, that it is not clear from AT&T's comments whether they are looking on amateur use of this band in terms of what they believe to be its present light level of occupancy. Current amateur use of the frequencies near 2400 MHz is not light when amateur satellites are considered, but such activity presently is of a downlink receive-only type. Other amateur activity in the band is, of course, two-way. Furthermore, both amateur and amateur satellite activity is certain to increase markedly with the launch of the Phase 3D satellite scheduled on the second engineering flight test of the Ariane 5 launch vehicle in April 1996. As stated in our comments[16], AMSAT believes that sharing with spread spectrum Part 15 devices such

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[15] Reply comments of At&T Corp. filed June 30,1994 beginning at the bottom of page 7.

[16] See AMSAT comments at para. 4.

as discussed by AT&T (and also by IBM) is potentially possible. However, in furtherance of the intent of Congress in the Reconciliation Act, AMSAT requests that the Commission require AT&T, and other large commercial enterprises, desiring to use this band for such applications and possessing substantial resources for the purpose, to conduct and submit to the Commission more extensive analysis on the effects of the operation of their equipment on amateur radio, including amateur satellite operation. The amateur community is not in a position to accomplish this, as it is not familiar with the specific characteristics of the emissions or susceptibility to interference of the equipment involved.

7. Apple Computer Co.[17] is one of the few in the non-amateur sector which acknowledged the potential impact on amateur radio of action the Commission might consider in this proceeding. Apple even noted that the unique contributions made by amateurs depends on the availability of adequate spectrum. Apple states:

"Each of these bands, and others in the amateur service, are essential components of a set of band segments extending through much of the radio spectrum. Each amateur band has certain characteristic attributes, in permitted signaling, in available bandwidths and in propagation, that allow hams to experiment, develop and use it appropriately for those band-specific attributes. Any change in the status of one band can affect other amateur bands. In the past the Commission has made allocation decisions affecting a single amateur band without addressing these secondary effects, resulting in an overall pattern of diminishing the spectrum available for the amateur service."

Apple then goes on to suggest that the 2300-2310 and 2390-2400 MHz segments could be a case in point, and suggests that:

"the Commission should make a package of coordinated decisions now, including;

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[17] See comments filed by Apple computer Co.

- Retain the present allocation of the entire 2390-2450 MHz band to the amateur service, affirming that no primary services will be licensed, auctioned or otherwise, in the 2400-2483.5 MHz band;

- Increase that allocation to extend over the balance of the Part 15 band at 2450-2483.5 MHz, with the full understanding by all parties that, this increased allocation is only applicable domestically and thus is not suitable for satellite based systems.

- As discussed above, allocate the 2390-2400 MHz band to the "most compatible sharing partner" among the band contenders (footnote deleted) which would clearly be low power Part 15 Data PCS services secondary to the amateur service and

- Declare that the 2300-2310 MHz band will maintain an amateur-exclusive status and will not be considered for reallocation after that band is released by the Federal Government."

8. AMSAT supports the Apple approach. While we have no concrete information regarding the characteristics of the emissions they propose for the Part 15 data-PCS equipment nor its susceptibility to interference from amateur transmissions, their approach generally follows that proposed by us[18]. We also see no objection to the limitation they propose with regard to 2450-2483.5 MHz not being available for the amateur satellite service, as any such allocation would have to be the subject of international negotiations, probably involving a WARC decision. In this portion of the spectrum, the 2400-245 MHz assignment represents adequate space for the amateur satellite service, particularly if 2400-2410 MHz is not subject to any new users and the amateur and amateur satellite services can be made primary in it. For the reasons cited in our comments[19], we particularly commend Apple for its recommendation with regard to the 2300-2310 MHz segment and urge the Commission to seriously consider all of their proposals.

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[18] See AMSAT Comments para. 23.

[19] See AMSAT Comments para. 7.

III Technical Considerations

9. Many of the comments which AMSAT has had the opportunity to examine are deficient technically in one way or more. For example, LQP urges allocating 2390-2400 MHz for mobile satellite uplinks and 2402-2417 MHz for mobile satellite downlinks[20]. In doing so, they fail to address the impact of their proposal on amateur radio or the possibility of sharing with the amateur and amateur satellite services. AMSAT contends that LQP makes marginal technical representations as to how and why non-GSO MSS will use this particular spectrum. In affect, they bluntly say to the Commission, "Give us all the spectrum available and we'll figure out how to use it later." Specifically, they make what we consider only passing reference to interference from ISM and Part 15 devices,[21] stating their belief that:

"ISM and Part 15 use would have <u>insignificant</u> (emphasis AMSAT's) impact on non-GSO MSS downlinks in this band. (Footnote deleted).

However, in their previous filing[22], they stated:

"LQP believes that the Commission should immediately advise NTIA that the 2402-2417 MHz band appears to have little potential for commercial services and seek to have NTIA identify other spectrum for inclusion in the 50 MHz to be made available this year."

In AMSAT's opinion, this abrupt change of heart concerning the usefulness of the 2402-2417 segment calls into question LQP's entire technical analysis of how any portion of this spectrum can be used for their intended application. Indeed, observations by amateur satellite operators show that interference from microwave ovens <u>is</u> present even at frequencies as low as 2400 MHz.

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[20] See LQP comments at Section II page 3.

[21] Id. Section III page 4.

[22] See Reply Comments of Loral/Qualcomm Partnership, LP filed June 30,1994 Section I page 3.

Amateur satellite operators' use of this portion of the spectrum, involves highly directional antennas which tend to reduce interference form nearby microwave ovens. On the other hand, LQP's proposed application, could be expected to employ hand-held transceivers with simple non-directional antennas. Furthermore, the bandwidths involved would probably exceed the approximately 3 kHz customarily used by amateur satellite operators to receive "S Band" downlink signals from the AMSAT OSCAR-13 satellite. It can only be concluded that LQP would expect to employ quite high PFDs in order to override interference from nearby microwave ovens, not to mention Part 15 devices which are becoming more and more prevalent especially in industrial and office environments where usage of hand-held MSS terminals would be expected to be common. Such high PFDs will, of course, lead to higher costs for MSS spacecraft and possibly cause interference to terrestrial services such as the aforementioned Part 15 devices. The high level of interference in this band, might even lead to significantly diminished utility of the MSS service. In this case, the Commission presumably would be asked to take steps to clear up the interference, or the MSS service would have to be moved to another part of the spectrum. Either course would be extremely costly to all concerned.

10. SWBT's proposal to establish wireless local loop service in the 2300-2310 and 2390-2400 MHz bands is, also not well thought out[23]. First, such a service could suffer interference from microwave ovens in the vicinity of 2400 MHz.. It is also conceivable that it could cause interference to Part 15 devices operating between 2400 and 2483.5 MHz.. In addition, although we do not have specific knowledge, and SWBT provided little in the way of detail with regard to the capability of their system, it appears that the WLL technology they propose would

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[23] See SWBT comments.

accommodate only relatively low bandwidth applications, i.e. voice and low data rate digital data. This might be appropriate to support today's needs. However, with the prospect of telephone companies bringing wideband video services into homes, it would seem that any new system being constructed should be capable of supporting that application. AMSAT wonders if the two 10 MHz wide segments being proposed for WLL by SWBT will be capable of handling multiple channels of full motion, possibly high definition, video to a number of homes simultaneously. If it cannot, we believe that it would be a mistake for the Commission to allocate valuable spectrum to a new service, that may well prove to be obsolete before it is even built. Would it not be preferable to develop WLL technology to the point that it could support the needs of the National Information Infrastructure (NII), in a much higher portion of the spectrum where far wider bandwidths can more readily be accommodated? AMSAT takes exception to SBWT's contention that higher frequencies would not be suitable from the propagation standpoint. The experience of radio amateurs and others clearly demonstrate that frequencies far higher than 2.4 GHz can be, and in fact are being, used for wideband communication over the typical paths and ranges involved in SWBT's proposed service. We contend that almost any frequency could be used for the short ranges involved. In addition to providing greater bandwidths and avoiding additional congestion in this already crowded part of the spectrum, the use of higher frequencies for WLL systems provides other significant advantages. Through the use of simple, small, directive antennas on the poles, or other outside terminal locations; security and interference rejection can be improved significantly. In addition the ability to reuse spectrum will be greatly enhanced.

11. Nevertheless, if the Commission should decide to authorize the type of WLL system being proposed by SWBT, despite its apparent near-term obsolescence and other weaknesses, AMSAT

contends that it should consider other frequency segments for it. There are two major reasons for this. First, the provision made by Congress in the Budget Reconciliation Act with respect to protection of amateur radio, cited above. Second there is the potential for interference from microwave ovens as well as interference from and to Part 15 systems., also already discussed. Particularly since WLL would involve relatively low power and short range, it could probably share with other services which would generally not be located in close proximity to homes and offices. Therefore, if the Commission feels that it must place WLL in this part of the spectrum, it might examine the possibility of assigning it 2310-2320 and 2380-2390 MHz or some other set of segments between 2320 and 2390 MHz. We are aware that some of this spectrum has been selected by the U.S. for BSS (sound). However, world pressures are likely to lead this country into adopting the same allocation for that service as the rest of the world, and thus forcing a move of airborne telemetry to the vicinity of 2350 MHz; a portion of the spectrum it was given when the 80 MHz segment from 2310-2390 MHz was withdrawn from the amateur service in 1984. WLL and airborne telemetry would appear to make rather ideal sharing partners.

12. As for interference to radioastronomy activities at Arecibo, PR, whether WLL operates at 2380 or 2390 MHz would appear to make little difference. The system would probably not be able to be used within a certain distance from the site in either case. Such a restriction would appear to be minor in comparison with the presumed benefits form it employment in the rest of the country.

13. AMSAT agrees with the statement of IBM:[24]

"The NPRM's proposals to reallocate this band are all the more puzzling because of the overwhelming record evidence that the presently cluttered state of the band would provide new licensed users with very little of value. Indeed, in its August 1994 report to NTIA, the Commission recognized that "[r]eallocation of the 2402-2417 MHz band presents little or no additional benefit to the public. (footnote deleted) The Commission based its findings in part on the substantial interference concerns present in the 2402-2417 MHz band."

IBM then goes on to quote the Commission's own words in the referenced report:[25]

"This would make it extremely difficult for any licensed communication system to operate and would greatly reduce the advantage of using advanced technologies . . . . [I]mplementing a communications system in this band will cost up to 50 times as much as a system operating in a band without interference from ISM devices." (footnote deleted)

IBM further states:[26]

"It makes little sense for the Commission to destroy Part 15 use of the spectrum, with its significant public benefits, in order to allocate the band to possible uses for which technology has not yet been -- and may not be -- invented."

AMSAT not only agrees with IBM in this statement, but further submits that affording the amateur service and the amateur satellite service continued access to this spectrum, as urged in the comments submitted by AMSAT[27] and ARRL[28], will better foster continued technological development than would reallocating it to some untested technology which might not be able to economically utilize it because of existing and increased interference from Part 15 and Part 18 devices.

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[24] See IBM comments filed Dec. 19, 1994 Section II page 12.

[25] FCC Report to the Secretary of Commerce, FCC 94-213 released August 9, 1994.

[26] See IBM Comments Section II page 14.

[27] See AMSAT Comments para. 23.

[28] See ARRL Comments para 24.

14. AMSAT also agrees with the statement of IBM:[29]

"Moreover, allocation of this spectrum to its incumbent uses best meets the statutory criteria enunciated by Congress in the Omnibus Budget Reconciliation Act of 1993 as amended, 47 U.S.C. §§ 923, 925."

As we stated in our comments filed on the Docket,[30] AMSAT believes that amateur radio can share spectrum with spread spectrum Part 15 systems. As we said in reference to AT&T's proposal[31], however, we must caution that it is incumbent on those proposing such systems to include in their design an inherent resistance to interference. Otherwise, users are later liable to seek compensation from the manufacturers or attempt to have the Commission resolve interference problems by asking it to restrict operation of legitimate licensed services (in this case the amateurs) which occupied the spectrum prior to the design and deployment of the Part 15 systems.

IV Economic Considerations

15. While it might be considered outside the scope of this proceeding in a literal sense, AMSAT is of the opinion that a motivating force in the Commission's decision process on this proceeding is the desire to raise revenue for the U.S. Government through spectrum auctions. Thus the Commission may be inclined to follow a course other than that recommended by AMSAT, ARRL, IBM, AT&T, Apple and others to retain access to this spectrum for its present users, including the amateur service, amateur satellite service and Part 15 devices. However, we believe that any short-term benefit the Government might gain from such revenue would be more than offset by

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[29] See IBM Comments page 16.

[30] See AMSAT Comments para. 22 & 23.

[31] See AT&T Reply Comments filed June 30, 1994.

later costs and inefficiencies to the economy as a whole caused by the already-cited interference conditions associated with these band segments. Although the principle of spectrum auctions has become well established and has proven quite successful, AMSAT believes, as do IBM[32] and others participating in this proceeding, that this is simply the wrong portion of the spectrum for auctioning to new users. Nowhere is this view more eloquently stated than by the Commission itself:[33]

"One area of the reallocation plan presented in the Preliminary Report that needs to be addressed is the 2402-2417 MHz band. Reallocation of 2402-2417 MHz band presents little or no additional benefit to the public."

In addition, Congress has made it abundantly clear that;

"the Commission may not base a finding of public interest, convenience and necessity on the expectation of Federal revenues."[34]

Thus AMSAT contends that auctions at 2390-2417 MHz, or parts thereof, would be clearly inconsistent with the requirements of the Reconciliation Act, in addition to its already cited provisions dealing with the protection of amateur radio.

V Complying with the Reconciliation Act

16. AMSAT contends that by following the recommendations of ARRL, AMSAT and other amateur groups and individuals commenting, as well as those of IBM and AT&T and Apple; and rejecting those of other entities proposing to license new services in the spectrum in question; the Commission will be complying with the intent of the Reconciliation Act. All of those users arguing for not licensing new services to this spectrum represent private sector users. Thus the

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[32] See IBM Comments page 15.

[33] FCC report to NTIA August 9, 1994, para. 50.

[34] 47 U.S.C. $ 309 (j)(7)(A).

Commission will be making this spectrum available to the private sector as intended by the Reconciliation Act. Nowhere does the Reconciliation Act require that all of the spectrum released by NTIA be allocated to new licensed services if unlicensed and existing licensed services are, as we believe, better suited to making best use of the spectrum in question.

VI Conclusion

17. For the reasons discussed above, AMSAT reaffirms its recommendation that te following actions be taken:

a. Establish an amateur and amateur satellite allocation from 2400-2410 MHz on a Primary basis with no additional sharing partners other than the existing ISM assignment and spread spectrum Part 15 devices.

b. Retain access for the amateur service to 2390-2400 MHz and for the amateur-service to 2410-2450 MHz,

AMSAT also supports the ARRL recommendation that the amateur service be given Primary status on the entire band 2390-2450 MHz..

Respectfully Submitted,

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By William A. Tynan
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January 5, 1995

Certificate of Service

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